WHAT IS CLAIMED IS:

1. A corrosion inhibiting coating composition comprising:
a rare earth compound; and
a binder.

2. The composition of claim 1 wherein the rare earth compound is selected from the group consisting of rare earth oxides, mixed oxides, solid solution oxides, hydroxides, hydrated oxides, salts, triflates, complexes and combinations thereof.

3. The composition of claim 2 wherein the rare earth compound is anhydrous or hydrated.

4. The composition of claim 1 wherein the rare earth compound comprises one or more metal cations selected from the group consisting of praseodymium, terbium, cerium, samarium, ytterbium, yttrium, neodymium and combinations thereof.

5. The coating composition of claim 1 wherein the rare earth compound is selected from the group consisting of cerium oxide, cerium hydroxide, cerium solid solution mixed oxide, cerium oxide mixture, cerium salt, neodymium oxide, neodymium hydroxide, neodymium solid solution mixed oxide, neodymium oxide mixture, neodymium salt, praseodymium oxide, praseodymium hydroxide, praseodymium solid solution mixed oxide, praseodymium oxide mixture, praseodymium salt, ytterbium oxide, ytterbium hydroxide, ytterbium solid solution mixed oxide, ytterbium oxide mixture, ytterbium salt, yttrium oxide, yttrium hydroxide, yttrium solid solution mixed oxide, yttrium oxide mixture, yttrium salt, terbium oxide, terbium hydroxide, terbium solid solution mixed oxide, terbium oxide misture, terbium salt, and combinations thereof.

6. The composition of claim 1 wherein the rare earth compound is a

praseodymium compound.

7. The composition of claim 6 wherein the praseodymium compound is selected from the group consisting of praseodymium(III), praseodymium(III/IV), praseodymium(IV) compounds and mixtures thereof.

8. The composition of claim 6 wherein the praseodymium compound is a praseodymium(III) compound.

9. The coating composition of claim 8 wherein the praseodymium(III) compound is a praseodymium(III) oxide..

10. The composition of claim 6 wherein the praseodymium compound is a praseodymium(III/IV) compound.

11. The coating composition of claim 10 wherein the praseodymium(III/IV) compound is a praseodymium(III/IV) oxide.

12. The composition of claim 6 wherein the praseodymium compound is a praseodymium(IV) compound.

13. The composition of claim 1 comprising about 0.1 to about 90 wt% Pr_6O_{11}.

14. The composition of claim 1 comprising about 0.1 to about 28 wt% Pr_6O_{11}.

15. The coating composition of claim 1 further comprising one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders.

16. The coating composition of claim 15 wherein the one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders is a

sulfur, phosphorus or silicon oxyanion-containing salt.

17. The composition of claim 1 wherein the composition is selected from the group consisting of aqueous, solvent-based, and powder coating compositions.

18. The composition of claim 17 wherein the composition is an aqueous composition.

19. The composition of claim 2 wherein the binder is an organic polymer selected from the group consisting of epoxy, urethane, urea, acrylate, alkyd, melamine, polyester, vinyl, vinyl ester, silicone, siloxane, silicate, sulfide, sulfone, epoxy novolac, epoxy phenolic, amides, drying oils, and hydrocarbon polymers.

20. The composition of claim 19 wherein the organic polymer is an epoxy polymer.

21. The composition of claim 2 in combination with a material selected from the group consisting of linear and cyclic dextrins, triflic acid, triflates, acetates, talc, kaolin, organic-based ion exchange resins, and combinations thereof.

22. The composition of claim 21 comprising about 0.03 to about 5 wt% cyclodextrin, about 0.1 to about 0.5 wt % triflic acid, or about 0.1 to about 5 wt% ionic exchange resin.

23. The composition of claim 2 further comprising a material selected from the group consisting of gelatin and gelatin derivatives.

24. The composition of claim 23 comprising about 0.03 to about 5 wt% gelatin.

25. The composition of claim 2 further comprising a material selected from the

group consisting of amino acids, amino acid derivatives o and combinations thereof.

26. The composition of claim 25 wherein the amino acid is selected from the group consisting of glycine, arginine, and methionine.

27. The composition of claim 25 wherein the amino acid derivative is methionine sulfoxide or methionine methyl sulfoxide.

28. The composition of claim 22 comprising about 0.1 to about 5 wt% amino acid.

29. The composition of claim 2 wherein the rare earth compound is a rare earth carbonate or a rare earth triflate.

30. The composition of claim 2 further comprising a coloring pigment.

31. The composition of claim 30 wherein the coloring pigment is TiO_2.

32. A substrate coated with the composition of claim 1.

33. The substrate of claim 32 wherein the substrate is selected from the group consisting of aluminum, aluminum alloys, steel, galvanized steel, zinc, zinc alloys, magnesium, and magnesium alloys.

34. The substrate of claim 33 wherein the substrate is aluminum.

35. A corrosion inhibiting composition comprising:
a rare earth compound;
a binder; and
a neutral to slightly acidic generating extender or an acidic generating

extender.

36. The coating composition of claim 35 wherein the neutral to slightly acidic generating extender or the acidic generating extender is a sulfur, phosphorus or silicon oxyanion-containing salt.

37. The composition of claim 35 wherein the neutral to slightly acidic generating extender or the acidic generating extender is an anhydrous or hydrous lanthanide sulfate.

38. The composition of claim 35 wherein the metal sulfate is a neutral to slightly acidic generating extender or the acidic generating extender is selected from the group consisting of anhydrous magnesium sulfate, hydrous magnesium sulfate, anhydrous calcium sulfate, hydrous calcium sulfate, barium sulfate, samarium sulfate, and strontium sulfate.

39. The composition of claim 38 wherein the metal sulfate is hydrous calcium sulfate, anhydrous calcium sulfate or strontium sulfate.

40. The composition of claim 38 comprising about 1 to about 99 wt% metal sulfate.

41. The composition of claim 38 comprising about 45 to about 75 wt% metal sulfate.

42. The composition of claim 36 wherein the rare earth compound is selected from the group consisting of rare earth oxides, hydroxides, mixed oxides, solid solution oxides, hydrated oxides, salts, triflates, complexes, and combinations thereof.

43. The composition of claim 36 wherein the rare earth compound comprises one or more metal cations selected from the group consisting of praseodymium, terbium, cerium, samarium, ytterbium, yttrium, neodymium and combinations thereof.

44. The composition of claim 36 wherein the rare earth compound is a praseodymium compound.

45. The composition of claim 44 wherein the praseodymium compound is selected from the group consisting of praseodymium(III), praseodymium(III/IV), praseodymium(IV) compounds and combinations thereof.

46. The composition of claim 44 wherein the praseodymium compound is a praseodymium(III) compound.

47. The coating composition of claim 44 wherein the praseodymium compound is a praseodymium(III) sulfate or a praseodymium(III/IV) oxide.

48. The composition of claim 44 wherein the praseodymium compound is a praseodymium(III/IV) compound.

49. The composition of claim 44 wherein the praseodymium compound is a praseodymium(IV) compound.

50. The composition of claim 43 wherein the composition is selected from the group consisting of aqueous, solvent-based, and powder coating compositions.

51. The composition of claim 43 wherein the binder is an organic polymer selected from the group consisting of epoxy, urethane, urea, acrylate, alkyd, melamine, polyester, vinyl, vinyl ester, silicone, siloxane, silicate, sulfide, sulfone,

polysulfide, epoxy novolac, epoxy phenolic, amides, drying oils, and hydrocarbon polymers.

52. The composition of claim 51 wherein the organic polymer is an epoxy polymer.

53. The composition of claim 43 wherein the binder is an inorganic polymer selected from the group consisting of silicone, siloxane and silicate polymers.

54. The composition of claim 43 further comprising a coloring pigment.

55. The composition of claim 54 wherein the coloring pigment is TiO_2.

56. A corrosion inhibiting primer composition comprising:
a praseodymium (III/IV) mixed oxide; and
a binder.

57. The composition of claim 56 wherein the composition is selected from the group consisting of aqueous, solvent-based, and powder coating compositions.

58. The composition of claim 56 wherein the binder is an organic polymer selected from the group consisting of epoxy, urethane, urea, acrylate, alkyd, melamine, polyester, vinyl, vinyl ester, silicone, siloxane, silicate, sulfide, sulfone, polysulfide, epoxy novolac, epoxy phenolic, amides, drying oils, and hydrocarbon polymers.

59. The composition of claim 58 wherein the organic polymer is an epoxy polymer.

60. The composition of claim 56 wherein the binder is an inorganic polymer

selected from the group consisting of silicone, siloxane and silicate polymers.

61. The composition of claim 56 further comprising a coloring pigment.

62. The composition of claim 61 wherein the coloring pigment is TiO_2

63. A corrosion inhibiting coating composition comprising:

a binder; and

a rare earth element mixed oxide comprising two or more rare earth element oxides selected from the group consisting of oxides, mixed oxides, solid solution oxides, hydrated oxides and hydroxides.

64. The composition of claim 63 wherein at least one of the rare earth element oxides is selected from the group consisting of Y_2O_3; La_2O_3, CeO_2, $Pr(OH)_3$, PrO_2, Pr_2O_3, Pr_6O_{11}, Nd_2O_3, Sm_2O_3, Tb_4O_7, and Yb_2O_3.

65. The composition of claim 63 wherein at least one of the rare earth element oxides is selected from the group consisting of PrO_2, Pr_2O_3, and Pr_6O_{11}.

66. The composition of claim 63 further comprising a neutral to slightly acidic generating extender or an acidic generating extender.

67. A corrosion inhibiting coating composition comprising:

a binder; and

one or more rare earth praseodymium or terbium oxides selected from the group consisting of oxides, mixed oxides, solid solution oxides, hydrated oxides and hydroxides.

68. The composition of claim 67 wherein at least one of the rare earth element oxides is selected from the group consisting of PrO_2, Pr_2O_3, and Pr_6O_{11}.

69. The composition of claim 67 further comprising a neutral to slightly acidic generating extender or an acidic generating extender.

70. A corrosion inhibiting coating composition having a local pH or ionic activity comprising:

a binder; and

one or more rare earth element oxides selected from the group consisting of oxides, mixed oxides, solid solution oxides and hydroxides, wherein at least one of the rare earth element oxides is an anhydrous praseodymium oxide; and

a metal sulfate.

71. A corrosion inhibiting coating composition comprising:

an effective corrosion inhibiting amount of one or more neutral to slightly acidic generating extenders or acidic generating extenders; and

a binder.

72. The composition of claim 71 wherein the binder is an organic polymer selected from the group consisting of epoxy, urethane, urea, acrylate, alkyd, melamine, polyester, vinyl, vinyl ester, silicone, siloxane, silicate, sulfide, sulfone, polysulfide, epoxy novolac, epoxy phenolic, amides, drying oils, and hydrocarbon polymers.

73. The composition of claim 72 wherein the organic polymer is an epoxy polymer.

74. The composition of claim 71 wherein the binder is an inorganic polymer selected from the group consisting of silicone, siloxane and silicate polymers.

75. The composition of claim 74 wherein the inorganic polymer is selected from

a group consisting of silicates, silicones, silicate polymers, and combinations thereof.

76. The composition of claim 71 wherein the binder is a composite.

77. The composition of claim 76 wherein the composite is a carbon fiber composite.

78. The composition of claim 71 wherein at least one of the one or more neutral to slightly acidic generating extenders or acidic generating extender is a sulfur, phosphorus or silicon oxyanion salt.

79. The composition of claim 78 wherein the sulfur, phosphorus or silicon oxyanion salt is selected from the group consisting of a metal cation sulfate, a metal cation sulfite, a metal cation sulfonate, a metal cation protonated phosphate, a cation phosphate, a metal cation phosphonite, an oxyphosphate, a clay mineral kaolin and combinations thereof.

80. The composition of claim 71 wherein the one or more neutral to slightly acidic generating extenders or acidic generating extenders are added at a weight percent of about 100% of total extender content.

81. The composition of claim 71 further comprising other components selected from the group consisting of linear and cyclic dextrins, triflic acid, triflates, acetates, talc, kaolin, organic-based ion exchange resins, and combinations thereof.

82. The composition of claim 71 further comprising gelatin, gelatin derivatives, and combinations thereof.

83. The composition of claim 71 further comprising amino acids, derivatives of

amino acids, and combinations thereof.

84. A substrate coated with the composition of claim 71.

85. The substrate of claim 84 wherein the substrate is selected from the group consisting of aluminum, aluminum alloys, steel, galvanized steel, zinc, zinc alloys, magnesium, magnesium alloys and composites.

86. The substrate of claim 85 wherein the substrate is aluminum.

87. A corrosion inhibiting composition comprising:

an effective corrosion-inhibiting amount of a neutral to slightly acidic generating extender or an acidic generating extender having a metal cation selected from the group consisting of calcium, strontium, and barium; and

a binder.

88. The composition of claim 87 wherein the binder is an organic polymer.

89. The composition of claim 87 wherein the organic polymer is selected from a group consisting of epoxy, urethane, urea, acrylate, alkyd, melamine, polyester, vinyl, vinyl ester, silicone, siloxane, silicate, sulfide, sulfone, epoxy novolac, epoxy phenolic, amides, drying oils, hydrocarbon polymers and combinations thereof.

90. The composition of claim 87 wherein the binder is an inorganic polymer.

91. The composition of claim 90 wherein the inorganic polymer is selected from a group consisting of silicates, silicones, silicate polymers, and combinations thereof.

92. The composition of claim 87 wherein the neutral to slightly acidic

generating extender is a metal cation selected from the group consisting of metal cation sulfates, metal cation phosphates, metal cation silicates, and combinations thereof.

93. The composition of claim 87 further comprising a metal cation is selected from the group consisting of yttrium, a lanthanide, and combinations thereof.

94 The composition of claim 87 wherein the neutral to slightly acidic generating extender or the acidic generating extender is a metal sulfate.

95. The composition of 87 wherein the neutral to slightly acidic generating extender or acidic generating extender is added in a weight percent of about 100% of total extender content.

96. The composition of claim 87 further comprising other components selected from the group consisting of linear and cyclic dextrins, triflic acid, triflates, acetates, talc, kaolin, organic-based ion exchange resins, and combinations thereof.

97. The composition of claim 87 further comprising gelatin, gelatin derivatives, and combinations thereof.

98. The composition of claim 87 further comprising amino acids, derivatives of amino acids and combinations thereof.

99. A coating system comprising:

a coating containing an effective corrosion-inhibiting amount of one or more rare earth compounds, one or more neutral to slightly acidic extenders or one or more acidic extenders applied to a substrate.

100. The coating system of claim 99 further comprising one or more pretreatment

coatings applied to the substrate to form a pretreated substrate and a topcoat.

101. The coating system of claim 100 wherein the topcoat is a urethane topcoat.

102. The coating system of claim 99 wherein the coating system is a resin system.

103. The coating system of claim 99 wherein the coating system is selected from the group consisting of a UV-coating system, electrolytic coating system, appliqué, powder coating system, and microwave coating system.

104. The coating system of claim 99 wherein the substrate is coated by a method selected from the group consisting of spraying, brushing, rolling and dipping.

105. The coating system of claim 99 wherein the substrate is a composite substrate.

106. The coating system of claim 99 wherein the substrate is selected from the group consisting of aluminum, aluminum alloys, steel, galvanized steel, zinc, zinc alloys, magnesium, and magnesium alloys.

107. A coating system comprising:

one or more pretreatment coatings applied to a substrate to form a pretreated substrate; and

a coating containing an effective corrosion-inhibiting amount of a corrosion-inhibiting carbon pigment combined with a neutral to slightly acidic generating extender or an acidic generating extender, the coating applied to the pretreated substrate.

108. The coating system of claim 107 further including a urethane topcoat.

109. The coating system of claim 106 wherein the coating system is selected from the group consisting of a UV-coating system, electrolytic coating system, appliqué, powder coating system, and microwave coating system.

110. The coating system of claim106 wherein the pretreated substrate is coated by a method selected from the group consisting of spraying, brushing, rolling and dipping.

111. A coating system comprising:

One or more pretreatment coatings applied to a substrate to form a pretreated substrate; and

a coating containing an effective corrosion-inhibiting amount of one or more rare earth compounds, one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders; and

at least one or more other components, the coating applied to the pretreated substrate.

112. The coating system of claim 111 further including a urethane topcoat.

113. The coating system of claim 111 wherein the coating system is a resin system.

114. The coating system of claim 111 wherein the coating system is selected from the group consisting of a UV-coating system, electrolytic coating system, appliqué, powder coating system, and microwave coating system.

115. The coating system of claim111 wherein the pretreated substrate is coated by a method selected from the group consisting of spraying, brushing, rolling and dipping.

116. The coating system of claim 111 wherein the pretreated substrate is a composite substrate.

117. A method for coating a substrate with a composition comprising treating the substrate with a composition of claim 1, and curing the applied composition.

118. A method for coating a substrate comprising treating the substrate with a conversion coating, applying the composition of claim 1, and curing the applied composition.

119. The method of claim 118 wherein the conversion coating is selected from the group consisting of cerium conversion coatings, praseodymium conversion coatings, phosphate conversion coatings, zinc-type conversion coatings, and chromium conversion coatings and anodized-type coatings.

120. The method of claim 119 wherein the conversion coating is a chromium conversion coating.

121. A method for preparing a coating composition comprising:

preparing a paint formulation; and

adding an effective corrosion-inhibiting amount of a rare earth compound, a neutral to slightly acidic generating extender or an acidic generating extender to the paint formulation to produce a coating composition.

122. The method of claim 121 further comprising pre-dispersing the rare earth compound, the neutral to slightly acidic generating extender or acidic generating extender with a dispersant.

123. A method comprising:

providing a substrate to be coated; and

coating the substrate with a coating composition having an effective corrosion-inhibiting amount of a rare earth compound, a neutral to slightly acidic generating extender or an acidic generating extender.

124. The method of claim 123 wherein the substrate is a pretreated substrate.

125. The method of claim 124 wherein the pretreated substrate is coated by a method selected from the group consisting of spraying, brushing, rolling and dipping.

126. The method of claim 123 further comprising applying a topcoat.

127. The coating composition of claim 7 wherein at least one of the one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders is a sulfur, phosphorus or silicon oxyanion-containing salt.

128. The coating composition of claim 7 wherein at least one of the one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders is a sulfate.

129. The coating composition of claim 115 wherein the sulfate is a metal sulfate.

130. The coating composition of claim 116 wherein the metal sulfate is selected from the group consisting of calcium sulfate, strontium sulfate, magnesium sulfate, barium sulfate and combinations thereof.

131. The coating composition of claim 7 wherein at least one of the one or more neutral to slightly acidic generating extenders or one or more acidic generating extenders is a phosphate.

132. The coating composition of claim 29 wherein the rare earth compound is a praseodymium(III) sulfate or a praseodymium(III/IV) oxide.

133. The coating composition of claim 57 wherein the extender is substantially soluble.

134. The coating composiion of claim 87 wherein the extender is a neutral to slightly acidic generating extender or an acidic generating extender.

135. The coating system of claim 99 wherein the extender is a neutral to slightly acidic generating extender or an acidic generating extender.

136. The coating system of claim 106 wherein the coating system is a resin system.

137. The coating composition of claim 128 wherein the sulfate is a praseodymium sulfate.